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(54) ADHESIVE COMPOSITION AND TACKY SHEETS USING THE SAME COMPOSITION

(57)Abstract:

PURPOSE: To obtain an adhesive agent composition stably showing bond strength and cohesive force and to prepare a tacky sheet using the composition.

CONSTITUTION: A 2-14C alkyl group-containing (meth)acrylic alkyl ester (a) is copolymerized with 0.05-80wt.% of a (meth)acrylic acid alkyl ester (b) containing a carboxyl group or a hydroxyl group at the end and an alkyl group of 3-14 total carbons as an ester side chain. Action effect essentially possessed by a functional group can be effectively exhibited to the maximum by making the number of carbons of the alkyl groups of the monomer (b) smaller than that of the monomer (a) by one or the same or larger.

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CLAIMS

- [Claim(s)]
- [Claim 1] The binder constituent which comes to copolymerize the following monomer (a) and (b) as an indispensable component.
(a) 20 - 99.95 % of the weight of acrylic-acid alkyl ester which uses as an ester side chain the alkyl group whose numbers of total carbon are 2-14 (meta).
(b) 0.05 - 80 % of the weight of acrylic-acid alkyl ester which has a carboxyl group or hydroxyl at the end, and uses as an ester side chain the alkyl group whose numbers of total carbon are 3-14 (meta).
- [Claim 2] The binder constituent according to claim 1 whose alkyl group of a monomer (a) and a monomer (b) is a straight chain alkyl group.
- [Claim 3] or [that the carbon number of the alkyl group of a monomer (b) is one piece fewer than the carbon number of the alkyl group of a monomer (a)] -- or the binder constituent according to claim 2 which is more than the same number.
- [Claim 4] The binder constituent according to claim 1 one [at least] alkyl group of whose of a monomer (a) and a monomer (b) is a branched chain alkyl group.
- [Claim 5] or [that the carbon number of the alkyl straight chain which has the functional group of a monomer (b) is one piece fewer than the carbon number of the longest alkyl straight chain of the alkyl group of a monomer (a)] -- or the binder constituent according to claim 4 which is more than the same number.
- [Claim 6] The binder constituent according to claim 1 to which it comes to carry out copolymerization of the copolymeric monomer (c) of further others in 30 or less % of the weight of the range of the total amount of monomers.
- [Claim 7] The pressure sensitive adhesive sheets which come to form at least in one side of a base material the binder layer obtained from a binder constituent according to claim 1
- [Claim 8] The pressure sensitive adhesive sheets according to claim 7 by which bridge formation processing of the binder layer is carried out

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates about pressure sensitive adhesive sheets which come to use a binder constituent and this, such as adhesive tape and a pressure sensitive adhesive sheet, to the binder constituent which can utilize for the maximum the operation effectiveness which the functional group of the monomer end used in order to obtain a binder constituent in detail has, and pressure sensitive adhesive sheets.

[0002]

[Description of the Prior Art] The adhesive tape and pressure sensitive adhesive sheet (henceforth pressure sensitive adhesive sheets) which come to prepare a binder layer in one side or both sides of a base material which consist of paper, plastic film, etc. from the former are used widely by various applications. The binder constituent for forming a binder layer is also various according to the application, and, generally a natural rubber system, a synthetic-rubber system, acrylic, the vinyl ether system, the silicone system, etc. are used. Among these binders, since the acrylic binder is excellent in degradation-proof properties, such as adhesion properties, such as adhesive strength, and adhesion (tuck), cohesive force, weatherability, and solvent resistance, thermal resistance, it is one of the typical binders.

[0003] Generally, although it makes acrylic-acid alkyl ester with a low (meta) glass transition temperature a principal component monomer and carries out copolymerization of the copolymeric monomers, such as a monomer which has a functional group in this, in order that an acrylic binder may give adhesiveness. When stress is received over long duration also with small stress, the problem of being easy to produce a gap and destruction and that cohesive force is insufficient, lack of the adhesion property under an elevated temperature, fluctuation of daily adhesive strength, etc. have many points which should still be improved depending on an application.

[0004] Since an acrylic binder can be prepared by the copolymerization reaction as mentioned above, it can perform improving an adhesive property and coherent comparatively easily by copolymerizing the polar monomer which has functional groups, such as a carboxyl group and hydroxyl, or copolymerizing polyfunctional monomers for internal bridge formation, such as di(meth)acrylate and glycidyl (meta) acrylate.

[0005] However, if such a polar monomer is copolymerized, the glass transition temperature of the binder (copolymer) obtained will rise, and it will become easy for adhesiveness, especially an initial adhesive property (tuck) to fall. Furthermore, there is a possibility that the adhesion property under low temperature may also fall with the rise of glass transition temperature, and there is a limitation also in the copolymerization ratio of such a polar monomer. Moreover, since a bridge is back-constructed and it raises coherent [of a binder], if the functional group in coating and the copolymer which should serve as a point constructing a bridge although it dries and being carried out to pressure sensitive adhesive sheets is incorporated in the chain of a copolymer in the solution which comes to dissolve a copolymer and a cross linking agent in the solvent of arbitration, prompt crosslinking reaction will not occur, but when crosslinking reaction advances with time, an adhesion property will change. Therefore, in order to obtain stable pressure sensitive adhesive sheets in respect of quality, sufficient aging actuation is needed and it can never be called a good thing from the field of improvement in productivity.

[0006]

[Problem(s) to be Solved by the Invention] The purpose of this invention is to offer the binder constituent in which the technical problem which the above-mentioned conventional acrylic binder constituent has is solved, and the outstanding adhesive strength and cohesive force are shown stably.

[0007] Moreover, other purposes of this invention are to offer the pressure sensitive adhesive sheets which come to use the above-mentioned binder constituent.

[0008]

[Means for Solving the Problem] In order that this invention persons may attain the above-mentioned purpose, as a result of repeating examination, mainly The acrylic-acid (meta) alkyl ester as an adhesive grant component, By using the functionality (meta) acrylic-acid alkyl ester which has a specific side chain as a monomer to copolymerize, the functional group in a copolymer is made to act effectively, and it finds out that the binder constituent excellent in an adhesive property and coherent can be obtained, and came to complete this invention.

[0009] That is, this invention relates to the binder constituent which comes to copolymerize the following monomer (a) and (b) as an indispensable component.

(a) 20 - 99.95 % of the weight of acrylic-acid alkyl ester which uses as an ester side chain the alkyl group whose numbers of total carbon are 2-14 (meta).

[0010] (b) 0.05 - 80 % of the weight of acrylic-acid alkyl ester which has a carboxyl group or hydroxyl at the end, and uses as an ester side chain the alkyl group whose numbers of total carbon are 3-14 (meta).

[0011] Especially, in the above-mentioned conditions, when the alkyl group of a monomer (a) and a monomer (b) is a straight chain alkyl

group, the carbon number of the alkyl group of a monomer (b) is one piece fewer than the carbon number of the alkyl group of a monomer (a), or it is desirable that it is more than the same number.

[0012] Moreover, when one [at least] alkyl group of a monomer (a) and a monomer (b) is a branched chain alkyl group in the above-mentioned conditions, the carbon number of the longest alkyl straight chain of the alkyl group of a monomer (b) is one piece fewer than the carbon number of the alkyl straight chain which has the functional group of a monomer (a), or it is desirable that it is more than the same number.

[0013] Furthermore, this invention relates to the pressure sensitive adhesive sheets which come to form at least in one side of a base material the binder layer obtained from the above-mentioned binder constituent.

[0014] As an ester side chain, the monomer (a) used in the binder constituent of this invention is acrylic-acid alkyl ester which has the alkyl-group whose numbers of total carbon are 2-14 (meta), and is a component which mainly gives an adhesion property to the constituent obtained. It is necessary to set the number of total carbon of the alkyl group as an ester side chain to 2-14 from an initial adhesive property, adhesiveness, and an adhesive point. Specifically Ethyl-acrylate (meta) ester, acrylic-acid (meta) propyl ester, Butyl acrylate ester, acrylic-acid (meta) pentyl ester, (Meta) Acrylic-acid hexyl ester, acrylic-acid (meta) heptyl ester, (Meta) Acrylic-acid octyl ester, acrylic-acid (meta) nonyl ester, (Meta) Acrylic-acid DESHIRU ester, acrylic-acid (meta) undecyl ester, (Meta) Acrylic-acid dodecyl ester, tridecyl acrylate (meta) ester, (Meta) (Meta) acrylic-acid tetradecyl ester mentions — having — these — straight chain ester — the branched chain ester as a structural isomer — you may be — a kind — or two or more sorts can be used together and it can use.

[0015] From the point of the property as a binder, copolymerization of the above-mentioned monomer (a) is preferably carried out in 30 - 99.95% of the weight of the range 20 to 99.95% of the weight into [all] a monomer as an indispensable component.

[0016] The acrylic-acid alkyl ester which has a carboxyl group or hydroxyl at the end, and, on the other hand, uses as an ester side chain the alkyl group whose numbers of total carbon are 3-14 as a monomer (b) (meta) is used. Although it has an alkyl group as an ester side chain like the above-mentioned monomer (a), this monomer (b) has the carboxyl group or hydroxyl as a functional group at the end of a side chain, by the functional group of an end, a polarity increases and its adhesion properties, such as an adhesive property and coherent, improve. And the methylene chain between the acryloyl radical used as the principal chain of the copolymer obtained and the functional group of an end acts in spacer, a degree of freedom is given to a copolymer principal chain, and the effectiveness of easing the rise of the glass transition temperature of a copolymer is demonstrated. Furthermore, by using as an ester side chain the alkyl group whose numbers of total carbon are 3-14, by making [more] it preferably than the number of total carbon of the alkyl group in a monomer (a), a functional group is made not to be incorporated in the chain of a copolymer, and the operation effectiveness which a functional group has can be demonstrated effectively. It is necessary to make the number of total carbon of the alkyl group in a monomer (b) or more into three for grant of the moderate degree of freedom to the above-mentioned effectiveness, especially a copolymer principal chain. Moreover, the phenomenon in which an ester side chain is too long when the number of total carbon exceeds 14, and the functional group of a side-chain end is incorporated inside a chain arises, or there is a possibility of causing an adhesive fall.

[0017] As an example of such a monomer (b), acrylic-acid (meta) 3-carboxy propyl ester, Acrylic-acid 4-carboxy butyl ester, acrylic-acid (meta) 5-carboxy pentyl ester, (Meta) Acrylic-acid 6-carboxy hexyl ester, acrylic-acid (meta) 3-hydroxy propyl ester, (Meta) Acrylic-acid 2-methyl-3-hydroxy propyl ester, (Meta) (Meta) acrylic-acid 4-hydroxy butyl ester, acrylic-acid (meta) 6-hydroxy hexyl ester, acrylic-acid (meta) 8-hydroxy octyl ester, etc. mention — having — among these — a kind — or two or more sorts can be used together and it can use.

[0018] Copolymerization of the above-mentioned monomer (b) is preferably carried out in 0.05 - 70% of the weight of the range 0.05 to 80% of the weight among [all] a monomer as an indispensable component. When effectiveness of the functional group contained in a monomer (b) when not filling to 0.05% of the weight cannot fully demonstrate and exceeds 80 % of the weight, since the amount of copolymerization of a monomer (a) decreases and the adhesion property as binders, such as initial adhesive strength, falls, it is not desirable. In addition, although the copolymerization range of the above-mentioned monomer (b) is comparatively wide, when making a functional group act as a point constructing a bridge, it is within the limits and the amount of copolymerization can be lessened [above-mentioned]. However, when making a functional group act not for the purpose of the point constructing a bridge but for the purpose of the cohesive-force improvement of a binder obtained, the amount of copolymerization can be made [many]. Therefore, it becomes the above range.

[0019] Furthermore, as for the above-mentioned monomer (a) which carries out copolymerization as an indispensable component in the binder constituent of this invention, and a monomer (b), it is desirable to have the following relation.

[0020] ** or [that the carbon number of the alkyl group of a monomer (b) is one piece fewer than the carbon number of the alkyl group of a monomer (a) when the alkyl group of a monomer (a) and a monomer (b) is a straight chain alkyl group] — or it is more than the same number.

[0021] ** or [that the carbon number of the alkyl straight chain which has the functional group of a monomer (b) is one piece fewer than the carbon number of the longest alkyl straight chain of the alkyl group of a monomer (a) when one / at least / alkyl group of a monomer (a) and a monomer (b) is a branched chain alkyl group] — or it is more than the same number.

[0022] That is, when a monomer (a) and a monomer (b) satisfy the relation between the above-mentioned ** or **, since pending of the functional group which exists in the end of a monomer (b) is carried out to the side chain by using a long methylene chain as a spacer, the amount of the functional group incorporated in the chain of a copolymer decreases, and the operation effectiveness which a functional group originally has as polarization or a point constructing a bridge can be demonstrated effectively.

[0023] Moreover, copolymerization of other copolymeric monomers (c) can be carried out to the binder constituent of this invention in addition to the above-mentioned monomer (a) and (b). By using such a copolymeric monomer (c), the property of the request according to an application can be given to the binder constituent obtained, for example, a polarity can be raised further, a hydrophilic property can be raised, or an adhesive property can be raised.

[0024] As such a copolymeric monomer (c) Specifically An acrylic acid (meta), a maleic acid, a maleic anhydride, an itaconic acid,

Carboxyl group content monomers, such as a crotonic acid and carboxy ethyl (meta) acrylate, Sulfo KISHIRU radical content monomers, such as 2-acrylamido-2-methyl propane sulfonic acid, Phospho KISHIRU radical content monomers, such as 2-hydroxyethyl acryloyl phosphate and 2-hydroxypropyl acryloyl phosphate, Acrylamide, N-permutation (meta) acrylamide, 3-acryloyloxypropyl amide, (Meta) 4-acryloyloxy butyl amide, 5-acryloyloxy pentyl amide, 4-acryloyloxy hexyl amide, an N-methyl-3-acryloyloxypropyl amide, An N and N-dimethyl-3-acryloyloxypropyl amide, an N-vinyl-2-pyrrolidone, Amide system monomers, such as N-vinyl carboxylic amide, vinyl acetate, styrene, Vinyl system monomers, such as alpha methyl styrene, glycidyl (meta) acrylate, 2-hydroxyethyl (meta) acrylate, 2-hydroxypropyl (meta) acrylate, Methyl (meta) acrylate, tetrahydrofurfuryl (meta) acrylate, Polyethylene-glycol (meta) acrylate, polypropylene-glycol (meta) acrylate, Functional-group content (meta) acrylate, such as a 1-acetoxy-4-acryloyloxy pentane, 6-acryloyloxy-ethylhexanoate, fluorine-containing (meta) acrylate, and ** silicon (meta) acrylate, etc. is mentioned. Moreover, the polyfunctional monomer for internal bridge formation of hexane JIORUJI (meta) acrylate, ethylene (Pori) GURIKORUJI (meta) acrylate, propylene (Pori) GURIKORUJI (meta) acrylate, neopentyl GURIKORUJI (meta) acrylate, pen TAERISURITORUTORI (meta) acrylate, dipentaerythritol hexa (meta) acrylate, etc., polyester (meta) acrylate, urethane (meta) acrylate, etc. can be used.

[0025] Also in the above-mentioned copolymeric monomer (c), the functional group in a copolymeric monomer (c) can demonstrate the operation effectiveness which it originally has to the maximum extent by choosing so that it may have the relation of a side-chain alkyl group like the monomer (a) in this invention, and a monomer (b).

[0026] the above-mentioned copolymeric monomer (c) does not check the property of said monomer (a) and a monomer (b) -- as -- the total amount of monomers -- a kind or two sorts or more can be preferably copolymerized in 25 or less % of the weight of the range 30 or less % of the weight.

[0027] The binder constituent of this invention uses said monomer (a) and monomer (b) as an indispensable component, and if needed, blend a monomer (c), it does not come to copolymerize, and especially the polymerization method is not limited. It is desirable to be able to adopt well-known polymerization methods, such as a solution polymerization method, an emulsion-polymerization method, a bulk-polymerization method, and a suspension-polymerization method, and to specifically perform polymerization actuation by radiation irradiation, such as ultraviolet rays, from the point of control of a reaction by the bulk-polymerization method which is a non-solvent polymerization method. Moreover, although a polymerization initiator is used in the above-mentioned polymerization, photopolymerization initiators, such as an azo system, the thermal polymerization initiator of a peroxide system and an acetophenone system, a benzoin ether system, and a ketal system, etc. can be used.

[0028] Furthermore, various additives, such as tackifiers, such as various bulking agents, such as a glass fiber, a glass bead, metal powder, and inorganic powder, natural resin, and synthetic resins, fats and oils, a surfactant, a pigment, and a coloring agent, can be blended with the binder constituent of this invention in the range below the 200 weight sections per copolymer 100 weight section if needed.

[0029] The binder constituent of above-mentioned this invention can be formed at least in one side of the base material which consists of various plastic film, a sheet, paper, textile fabrics, a nonwoven fabric, various foam films and a sheet, metallic foils, or these layered products in the shape of a layer by the thickness of about 5-2000 micrometers, and can be used as pressure sensitive adhesive sheets, such as adhesive tape and a pressure sensitive adhesive sheet. In addition, the pressure sensitive adhesive sheets of this invention obtained apply well-known release agents, such as silicone system resin and fluoro-resin, to a base material tooth back, it can wind in the shape of a roll, or it can cover them with the separator which applied the well-known release agent to the exposure front face of the formed binder layer.

[0030] Furthermore, the binder layer in the pressure sensitive adhesive sheets of this invention can also perform bridge formation processing in addition to the constructing bridge point grant by the monomer (b), or the improvement in cohesive force. Melamine resin, an isocyanate compound, an epoxy compound, an aziridine system compound, a peroxide, metal chelate compound, etc. can be blended with a copolymer as the approach of copolymerizing the monomer of internal cross-linking, such as polyfunctional (meta) acrylate illustrated as said monomer (c), as the approach of bridge formation processing, and an external cross linking agent, and approaches, such as heating, can be given. Furthermore, a bridge formation means to irradiate activity beams of light, such as not the above-mentioned bridge formation means but an electron ray and ultraviolet rays, and to construct a bridge is also employable.

[0031] By performing the above-mentioned bridge formation processing, the binder layer in the pressure sensitive adhesive sheets of this invention demonstrates the adhesion property which whose internal cohesive force improved and was excellent. As for extent of bridge formation, it is desirable to adjust so that it can adjust suitably according to an application, for example, may become 60% or more of gel molar fraction as an object for re-exfoliation 30 to 90% as an object for adhesion. The gel molar fraction in this case is a ratio of the binder (a remained part) which did not dissolve a binder layer in it after being immersed in ethyl acetate for one week under a room temperature.

[0032]

[Example] Although an example is used and this invention is explained still more concretely below, deformation various in the range which is not limited to these and does not deviate from the technical thought of this invention is possible for this invention. In addition, that it is with the section in the following sentences means the weight section.

[0033] In the example 1 polymerization reaction container, the ethyl-acetate 150 section, the acrylic-acid n-butyl ester 95 section, the acrylic-acid 5-carboxy pentyl ester 5 section, and the azobisisobutyronitril 0.5 section as a polymerization initiator were supplied, in the inert gas ambient atmosphere, the polymerization reaction was continuously performed at 80 degrees C in 60 degrees C for 2 hours for 4 hours, and the copolymer solution (99% of conversion) was prepared.

[0034] To the solid content 100 section of the obtained copolymer solution, the trimethylol propane-tolyene diisocyanate addition product 5 section as a cross linking agent was added, and the solution of the binder constituent of this invention was produced.

[0035] It applied so that the thickness after drying this solution on the polyester film of 25-micrometer thickness might be set to 50 micrometers, and stoving was carried out for 5 minutes at 120 degrees C, and the pressure sensitive adhesive sheet which has the binder layer over which the bridge was constructed was produced.

[0036] Except having considered as the acrylic-acid n-butyl ester 75 section and the acrylic-acid 5-carboxy pentyl ester 25 section in

example 2 example 1, the copolymer solution (about 99% of conversion) was prepared like the example 1, the cross linking agent was added still like the example 1, and the pressure sensitive adhesive sheet was produced.

[0037] Except having considered as the acrylic-acid n-butyl ester 40 section and the acrylic-acid 5-carboxy pentyl ester 60 section in example 3 example 1, the copolymer solution (about 99% of conversion) was prepared like the example 1, the cross linking agent was added still like the example 1, and the pressure sensitive adhesive sheet was produced.

[0038] Acrylic-acid n-butyl ester was made into the 95 sections in example of comparison 1 example 1, except having used the acrylic-acid 5 section instead of acrylic-acid 5-carboxy pentyl ester, the copolymer solution (about 99% of conversion) was prepared like the example 1, the cross linking agent was added still like the example 1, and the pressure sensitive adhesive sheet was produced.

[0039] Acrylic-acid n-butyl ester was made into the 90 sections in the example 1 of example of comparison 2 comparison, except having used the acrylic-acid 10 section, the copolymer solution (about 99% of conversion) was prepared like the example 1 of a comparison, the cross linking agent was added still like the example 1 of a comparison, and the pressure sensitive adhesive sheet was produced.

[0040] Acrylic-acid n-butyl ester was made into the 75 sections in the example 1 of example of comparison 3 comparison, except having used the acrylic-acid 25 section, the copolymer solution (about 99% of conversion) was prepared like the example 1 of a comparison, the cross linking agent was added still like the example 1 of a comparison, and the pressure sensitive adhesive sheet was produced.

[0041] The following property was measured about the pressure sensitive adhesive sheet obtained in the above-mentioned examples 1-3 and the examples 1-3 of a comparison. The result is shown in Table 1.

[0042] It measured according to the <initial adhesive property> dry tack. A defect does not almost have a tack by finger touch, and shows the condition that temporary immobilization (instant immobilization) cannot be performed.

[0043] The pressure sensitive adhesive sheet obtained in <initial adhesive strength> above-mentioned each example and the example of a comparison was cut out to 20mm width of face, and after making 1 **** of this into SUS-304 plate which carried out surface polish and sticking it to it by pressure with the roller of lamination and 2kg load with a sandpaper (#280), it was left for 20 minutes. Subsequently, according to JIS-Z -0237, the friction test was performed for this sample 180 degrees at the exfoliation rate for 300mm/using the tension tester, and that adhesive strength was measured.

[0044] After saving the same sample in 50-degree C humidistat on the 1st with having used for the <daily adhesive strength> above-mentioned initial adhesion test, the initial adhesion test and the same trial were performed.

<Water resisting property> After ***** (ing) the same sample to room temperature underwater with having used for said initial adhesion test for three days, the friction test was performed 180 degrees at the exfoliation rate for 300mm/using the tension tester, and the adhesive strength was measured.

[0045]

[Table 1]

		初期 接着性	初期接着力 (g/20mm幅)	経日接着力 (g/20mm幅)	耐水性 (g/20mm幅)
実 施 例	1	良好	9 0 0	1 4 0 0	6 0 0
	2	良好	9 5 0	1 5 0 0	6 0 0
	3	良好	9 0 0	2 5 0 0	4 0 0
比 較 例	1	良好	7 0 0	1 1 0 0	5 0 0
	2	不良	7 0 0	1 5 0 0	4 0 0
	3	不良	—	3 8 0 0	—

*) 初期接着力がほとんどなかった。

[0046] Even if the amount of copolymerization of acrylic-acid 5-carboxy pentyl ester increases, it does not have a fall adhesive the first stage, while an example article has a good initial adhesive property, so that clearly from the above-mentioned table 1. On the other hand, in the example article of a comparison, when the amount of copolymerization of the acrylic acid which does not have a methylene spacer increases, initial adhesive property and first stage adhesive strength also comes to be inferior.

[0047] Moreover, about the daily adhesive strength which added aging for one day at 50 degrees C, both an example article and the example article of a comparison show an upward tendency, and the example article of a comparison also demonstrates sufficient adhesive strength. However, since the example article of a comparison did not have the enough initial adhesive property, temporary immobilization of it was not completed and it was not practical. A methylene spacer is considered to ease in the glass transition temperature to which a binder constituent [in / in this / this invention] gets worse with the improvement in coherent.

[0048] However, about the waterproof trial, even if it was an example article, when the charge of a copolymerization component became an excessive amount, the inclination for the balance of a practical use property to collapse gradually was shown.

[0049] In the example 4 polymerization reaction container, the ethyl-acetate 150 section, the acrylic-acid n-butyl ester 99.9 section, the acrylic-acid 6-hydroxy hexyl ester 0.1 section, and the azobisisobutyronitril 0.5 section as a polymerization initiator were supplied, in the inert gas ambient atmosphere, the polymerization reaction was continuously performed at 80 degrees C in 60 degrees C for 2 hours for 4 hours, and the copolymer solution (99% of conversion) was prepared.

[0050] To the solid content 100 section of the obtained copolymer solution, the trimethylol propane-tolylene diisocyanate addition product 0.1 section as a cross linking agent was added, and the solution of the binder constituent of this invention was produced.

[0051] It applied so that the thickness after drying this solution on the polyester film of 25-micrometer thickness might be set to 50

micrometers, and stoving was carried out for 5 minutes at 120 degrees C, and the pressure sensitive adhesive sheet which has the binder layer over which the bridge was constructed was produced. Moreover, the binder layer was similarly formed on the releasing paper separately.

[0052] Except having considered as the acrylic-acid n-butyl ester 99.8 section and the acrylic-acid 6-hydroxy hexyl ester 0.2 section in example 5 example 4, the copolymer solution (about 99% of conversion) was prepared like the example 4, the cross linking agent was added still like the example 4, and the pressure sensitive adhesive sheet was produced.

[0053] Except having considered as the acrylic-acid n-butyl ester 99.5 section and the acrylic-acid 6-hydroxy hexyl ester 0.5 section in example 6 example 4, the copolymer solution (about 99% of conversion) was prepared like the example 4, the cross linking agent was added still like the example 4, and the pressure sensitive adhesive sheet was produced.

[0054] Except having used acrylic-acid 2-hydroxyethyl ester instead of acrylic-acid 6-hydroxy hexyl ester in example of comparison 4 example 4, the copolymer solution (about 99% of conversion) was prepared like the example 4, the cross linking agent was added still like the example 4, and the pressure sensitive adhesive sheet was produced.

[0055] Except having used acrylic-acid 2-hydroxyethyl ester instead of acrylic-acid 6-hydroxy hexyl ester in example of comparison 5 example 5, the copolymer solution (about 99% of conversion) was prepared like the example 5, the cross linking agent was added still like the example 5, and the pressure sensitive adhesive sheet was produced.

[0056] Except having used acrylic-acid 2-hydroxyethyl ester instead of acrylic-acid 6-hydroxy hexyl ester in example of comparison 6 example 6, the copolymer solution (about 99% of conversion) was prepared like the example 6, the cross linking agent was added still like the example 6, and the pressure sensitive adhesive sheet was produced.

[0057] The following property was measured about the pressure sensitive adhesive sheet obtained in the above-mentioned examples 4-6 and the examples 4-6 of a comparison. The result is shown in Table 2.

[0058] After carrying out 1 **** of the pressure sensitive adhesive sheets obtained in <holding power> above-mentioned each example and the example of a comparison and sticking them by pressure with the roller of lamination and 2kg load on a bakelite plate in 20mmx10mm [after riping for seven days at 50 degrees C] area, it was left for 20 minutes. Subsequently, the pendant of the 500g load was carried out to the edge of the longitudinal direction of the stuck sheet, and time amount until it leaves it under a 40-degree C ambient atmosphere and a pressure sensitive adhesive sheet falls was measured. In addition, after 1-hour progress measured the gap migration length after 1-hour progress, when a pressure sensitive adhesive sheet did not fall.

[0059] It is 2.2cm in a part of the binder layer after riping the binder layer formed on the releasing paper obtained in <gel molar fraction> above-mentioned each example and the example of a comparison for seven days at 50 degrees C. It judged on the square, it put into the bag which consists of polytetrafluoroethylene porous membrane which has a 0.2-micrometer aperture, and was immersed under the room temperature for one week into ethyl acetate. Beforehand, weight in a bag is measured, the binder layer weight before immersion and the dry weight after immersion were found, and the ratio for un-dissolving (a part for gel) in a binder layer was measured.

[0060]

[Table 2]

		保持力		ゲル分率
		落下時間	スレ距離	
実施例	4	—	0.6 mm	50 %
	5	—	0.2 mm	70 %
	6	—	0.1 mm	85 %
比較例	4	8 分	—	0 %
	5	8 分	—	0 %
	6	—	—	30 %

[0061] An example article shows the adhesion property (coherent) in which crosslinking reaction fully occurred and copolymerization of a small amount of acrylic-acid 6-hydroxy hexyl ester was also excellent so that clearly from the above-mentioned table 2. On the other hand, although the acrylic-acid 2-hydroxyethyl ester which should have many amounts of installation is used for stoichiometric in the example article of a comparison, crosslinking reaction is not fully performed compared with an example article, consequently becomes insufficient [cohesive force].

[0062] As mentioned above, this invention article acts in [the alkyl group in a monomer (b)] spacer, and it is clear from the result of Table 1 and 2 the functional group's of an end to fully demonstrate the introductory effectiveness.

[0063] Seven to example 9 examples 7-9 were equivalent to examples 4-6, and produced the pressure sensitive adhesive sheet like each example except [all] having replaced with acrylic-acid iso octyl ester the acrylic-acid n-butyl ester used for each example.

[0064] Holding power and a gel molar fraction were measured like [pressure sensitive adhesive sheet / which was obtained in the examples 7-9] the above, and the result was shown in Table 3.

[0065]

[Table 3]

		保持力		ゲル分率
		落下時間	スリ距離	
実施例	7	—	0.3 mm	67 %
	8	—	0.8 mm	50 %
	9	—	0.1 mm	78 %

[0066] The amount of the acrylic-acid 5-carboxy pentyl ester used in example 10 example 3 was made into the 55 sections, and the pressure sensitive adhesive sheet was produced like the example 3 except having added the acrylic-acid 5 section further.

[0067] The pressure sensitive adhesive sheet was produced like the example 2 in the example 11 example 2 except having not added a cross linking agent.

[0068] An initial adhesive property, initial adhesive strength, daily adhesive strength, and a water resisting property were measured like [pressure sensitive adhesive sheet / which was obtained in the examples 10 and 11] the above, and the result was shown in Table 4.

[0069]

[Table 4]

		初期 接着性	初期接着力 (g/20mm幅)	経日接着力 (g/20mm幅)	耐水性 (g/20mm幅)
実施例	10	良好	9 5 0	3 1 0 0	4 5 0
	11	良好	1 2 0 0	1 1 0 0	6 0 0

[0070]

[Effect of the Invention] As mentioned above, the pressure sensitive adhesive sheets which come to use the binder constituent and this constituent of this invention can make the maximum owner effect demonstrate the operation effectiveness which the functional group which exists in a monomer originally has with the combination of a specific monomer, and it demonstrates adhesion properties, such as coherent [which solved the fault which the conventional acrylic binder has / outstanding], and adhesiveness, an adhesive property.

[Translation done.]